

Your abstract submission has been submitted for the 2015 AGU Fall Meeting. You will receive an email confirmation.

Click [HERE](#) to print this page now.

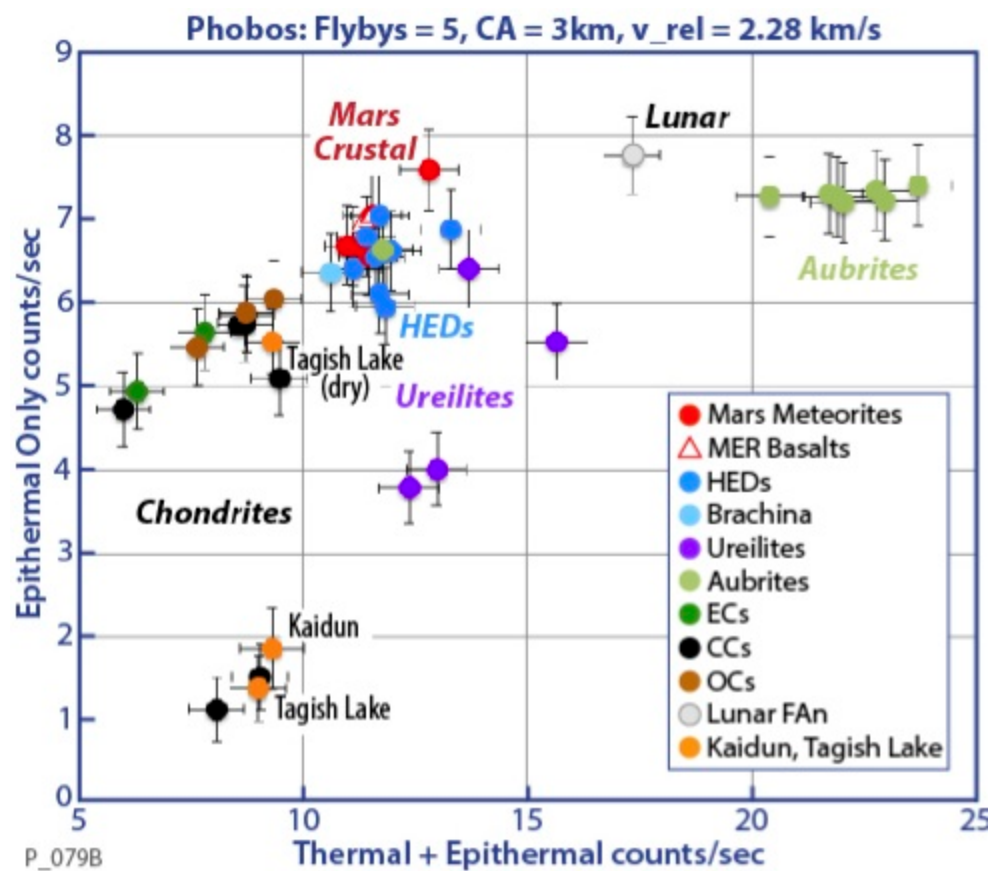
Receipt of this notice does not guarantee that your submission was accepted for the 2015 AGU Fall Meeting. All submissions are subject to review and acceptance by the Program Committee. You may review or edit your abstract submission until the deadline of 6 August 2015 23:59 EDT/03:59 +1 GMT. After this date, no further edits will be made to the submission.

Using Neutron Spectroscopy to Constrain the Composition and Provenance of Phobos and Deimos

Richard C Elphic, NASA Ames Research Center, Moffett Field, CA, United States

Abstract Text:

The origin of the martian moons Phobos and Deimos is obscure and enigmatic. Hypotheses include the capture of asteroids originally from the outer main belt or beyond, residual material left over from Mars' formation, and accreted ejecta from a large impact on Mars, among others. Measurements of reflectance spectra indicate a similarity to dark, red D-type asteroids, but could indicate a highly space-weathered veneer. Here we suggest a way of constraining the near-surface composition of the two moons, for comparison to known meteoritic compositions. Neutron spectroscopy, particularly the thermal and epithermal neutron flux, distinguishes clearly between various classes of meteorites and varying hydrogen (water) abundances. Perhaps most surprising of all, a rendezvous with Phobos or Deimos is not necessary to achieve this. A low-cost mission based on the LADEE spacecraft design in an eccentric orbit around Mars can encounter Phobos every 2 weeks. As few as five flyby encounters at speeds of 2.3 km/sec and closest-approach distance of 3 km provide sufficient data to distinguish between ordinary chondrite, water-bearing carbonaceous chondrite, ureilite, Mars surface, and aubrite compositions. A one-Earth year mission design includes many more flybys at lower speeds and closer approach distances, as well as similar multiple flybys at Deimos in the second mission phase, as described in the Phobos And Deimos Mars Environment (PADME) mission concept. This presentation will describe the expected thermal and epithermal neutron fluxes based on MCNP6 simulations of different meteorite compositions and their uncertainties.



Topic Selection: The Science of Exploration as enabled by the Moon, Near Earth Asteroids and the moons of Mars

Title: Using Neutron Spectroscopy to Constrain the Composition and Provenance of Phobos and Deimos

Submitter's E-mail Address: richard.c.elphic@nasa.gov

Preferred Presentation Format: Assigned by Program Committee (Oral or Poster)

First Presenting Author

Presenting Author

Richard C Elphic

Primary Email: richard.c.elphic@nasa.gov

Phone: 6506044164

Affiliation(s):

NASA Ames Research Center
Moffett Field CA (United States)

Student: No

If necessary, you can make changes to your abstract submission

- To access your submission in the future, point your browser to: [Full Menu Options](#).
- Your Abstract ID# is: 84195.
- Any changes that you make will be reflected instantly in what is seen by the reviewers.
- After the abstract proposal is submitted, you are not required to go through all submission steps to make edits. For example, click the "Authors" step in the Abstract Submission Control Panel to edit the Authors and then click save or submit.
- When you have completed your submission, you may close this browser window or submit another abstract <http://fallmeeting.agu.org/2015/Sessionviewer>.

[Tell us what you think of the abstract submission process](#)